NUMBER 144 'TRADER' SERVICE SHEETS

ALBA 540 A.C. SUPERHET

(ALSO 640 CONSOLE & 740 RADIOGRAM)

A FOUR-VALVE (plus rectifier) A.C. superhet chassis is fitted in the Alba 540 receiver, which is suitable for operation on mains of 190-250 V, 40-100 c.p.s. It has provision for a gramophone pick-up and extension speaker, and for using the mains as an aerial.

A similar chassis is fitted in the 640 console receiver and the 740 radiogramophone, but the latter is for 40-60 c.p.s. mains only.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L1, L2** to inductively coupled band-pass filter. Primary **L3, L4** tuned by **C16**; secondary **L7, L8** tuned by **C18**; coupling coils **L5, L6.**

First valve (**V1, Mullard metallised FC4**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L9, L10** tuned by **C20**; tracking by shaped plates and pre-set condenser **C22** (L.W.); anode reaction coils **L11, L12.**

Second valve, a variable-mu H.F. pentode (**V2, Mullard metallised VP4B**) operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C23, L13, L14, C24** and **C25, L15, L16, C26.**

Intermediate frequency 117·5 KC/S.

Diode second detector is part of separate double diode valve (**V3, Mullard metallised 2D4A**). Audio frequency component in rectified output is developed across load **R8** and passed via I.F. filter **C8, R7, C7,** coupling condenser **C10,** and manual volume control **R11** to C.G. of pentode output valve (**V5, Mullard PenA4** or **Pen4VB**). Tone correction by fixed condenser **C11.** Provision for connection of gramophone pick-up across volume control. Provision for connection of high impedance external speaker across primary of internal speaker transformer **T1.**

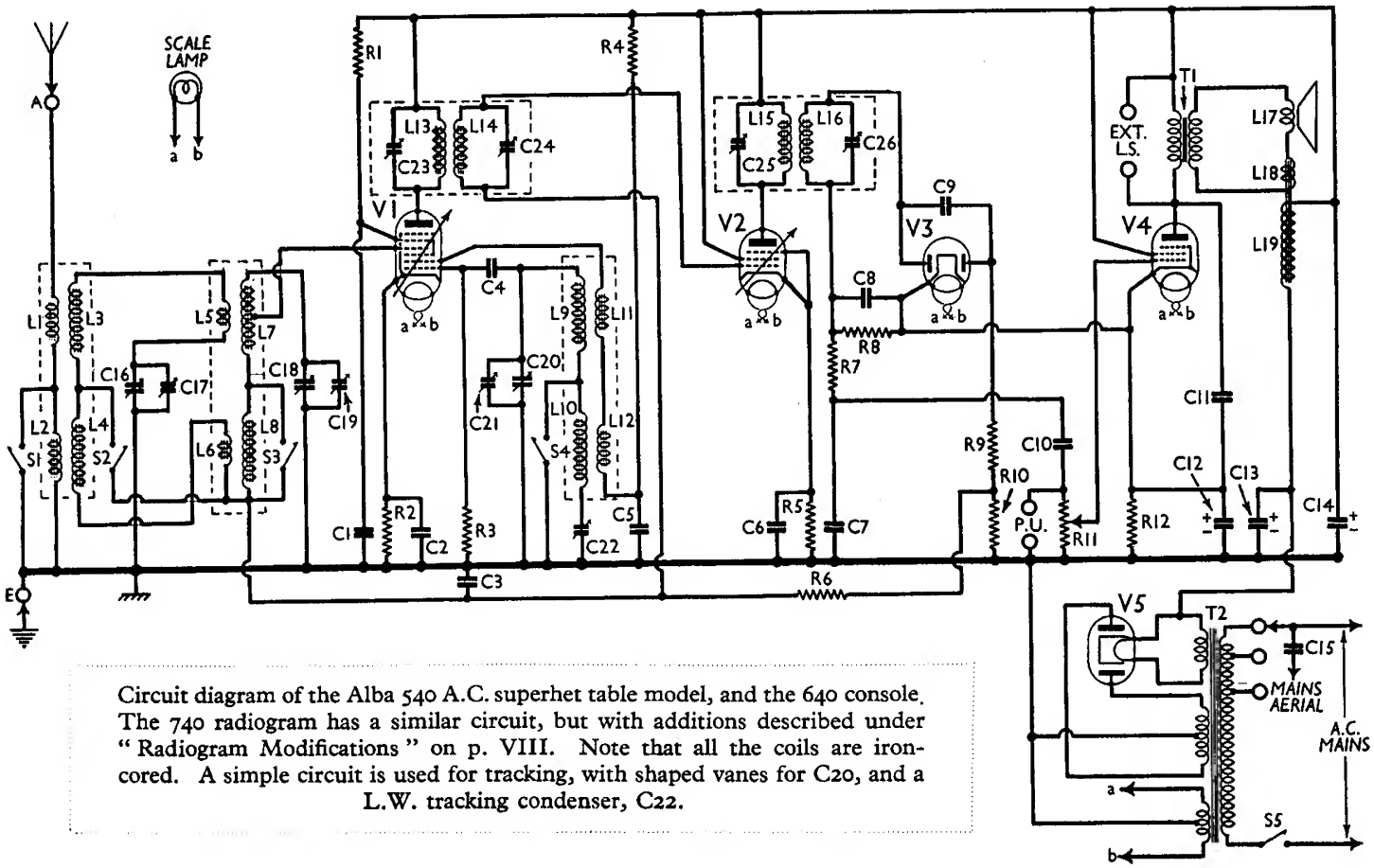
Second diode of **V3,** coupled by **C9,** provides D.C. potential which is developed across load resistances **R9, R10,** and fed back through decoupling circuit as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **V4** cathode resistance **R12.**

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V5, Mullard IW4/350** or **IW3**). Smoothing by speaker field coil **L19** and dry electrolytic condensers **C13, C14.** Mains aerial connection via **C15.**

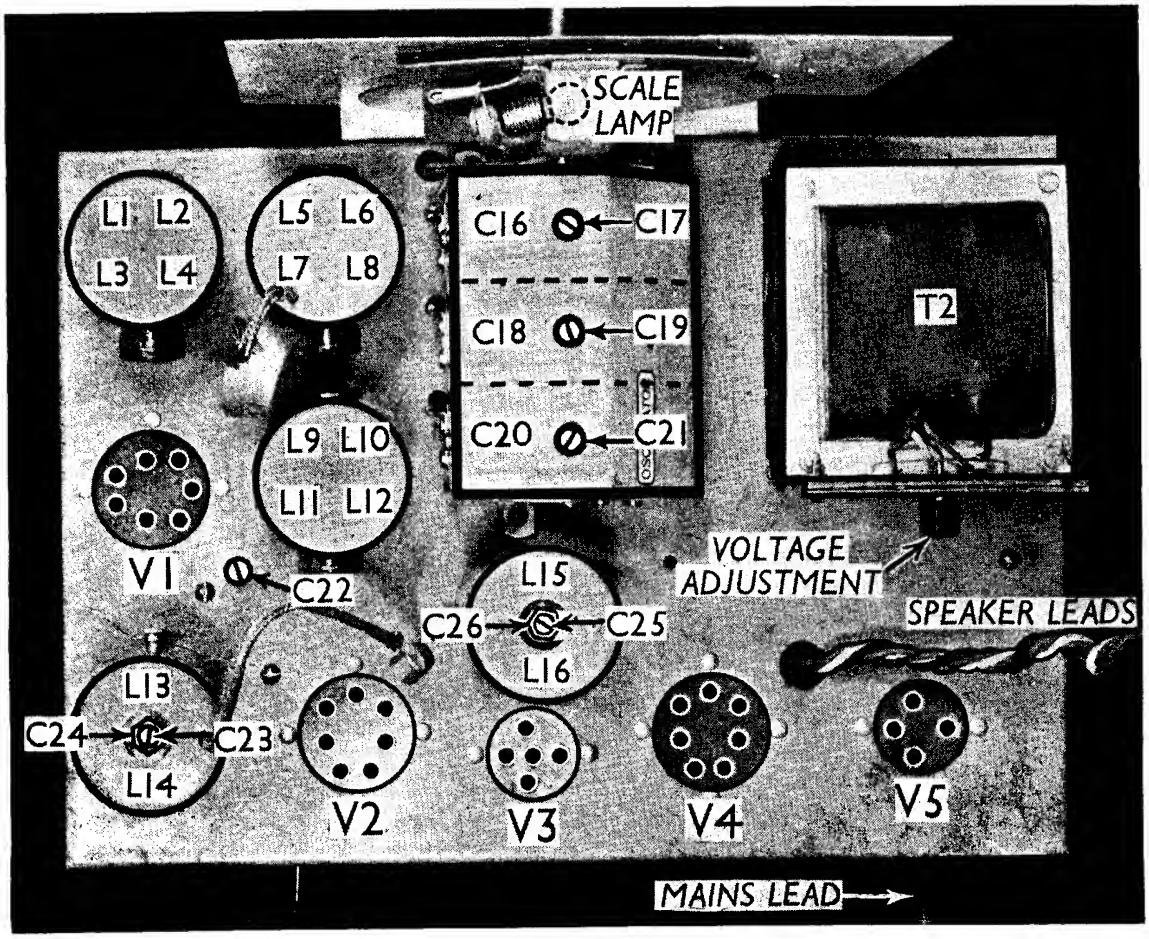
COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	V1 S.G.'s by-pass	0·1
C2	V1 cathode by-pass	0·1
C3	V1, V2 A.V.C. line decoupling	0·1
C4	V1 osc. C.G. condenser	0·00015
C5	V1 osc. anode decoupling	0·1
C6	V2 cathode by-pass	0·1
C7	I.F. by-passes	0·00015
C8	I.F. by-passes	0·00015
C9	Coupling to V3 A.V.C. diode	0·00025
C10	L.F. coupling to V4	0·005
C11	Tone corrector	0·005
C12*	V4 cathode by-pass	25·0
C13*	H.T. smoothing	6·0
C14*	H.T. smoothing	6·0
C15	Mains aerial coupling	0·00025
C16†	Band-pass primary tuning	—
C17‡	Band-pass primary trimmer	—
C18†	Band-pass secondary tuning	—
C19‡	Band-pass secondary trimmer	—
C20†	Oscillator tuning	—
C21‡	Oscillator trimmer	—
C22‡	Oscillator L.W. tracker	0·0007
C23‡	1st I.F. trans. pri. tuning	—
C24‡	1st I.F. trans. sec. tuning	—
C25‡	2nd I.F. trans. pri tuning	—
C26‡	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Alba 540 A.C. superhet table model, and the 640 console. The 740 radiogram has a similar circuit, but with additions described under "Radiogram Modifications" on p. VIII. Note that all the coils are iron-cored. A simple circuit is used for tracking, with shaped vanes for C20, and a L.W. tracking condenser, C22.



Plan view of the chassis. Note the dual adjustment of the I.F. trimmers, the screw controlling the primary trimmer in each case. C22, adjusted through a hole in the chassis, is the oscillator L.W. tracker.

	RESISTANCES	Values (ohms)
R1	V1 S.G.'s H.T. feed	50,000
R2	V1 fixed G.B. resistance	200
R3	V1 osc. C.G. resistance	50,000
R4	V1 osc. anode decoupling	100,000
R5	V2 fixed G.B. resistance	150
R6	V1, V2 A.V.C. line decoupling	1,000,000
R7	I.F. stopper	150,000
R8	V3 signal diode load	1,000,000
R9	V3 A.V.C diode load	300,000
R10		200,000
R11	Manual volume control	500,000
R12	V4 G.B. resistance	150

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial coupling coils	25·0
L2		30·0
L3	Band-pass primary coils	1·5
L4		9·0
L5	Band-pass coupling coils	0·2
L6		1·0
L7	Band-pass secondary coils	1·5
L8		9·0
L9	Oscillator tuning coils	1·3
L10		7·0
L11	Oscillator reaction coils	1·2
L12		2·1
L13	1st I.F. trans. Pri.	37·0
L14	1st I.F. trans. Sec.	37·0
L15	2nd I.F. trans. Pri.	37·0
L16	2nd I.F. trans. Sec.	37·0
L17	Speaker speech coil	1·8
L18	Hum neutralising coil	0·15
L19	Speaker field coil	2,000·0
T1	Speaker input trans. Pri.	480·0
	Speaker input trans. Sec.	0·7
T2	Mains trans. Pri. total	53·4
	Mains trans. Heater sec.	0·05
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. H.T. sec. total	600·0
S1-S4	Waveband switches	—
S5	Mains switch, ganged R11	—

DISMANTLING THE SET

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, first remove the three control knobs (recessed grub screws), the back, and the four bolts (with washers and rubber washers) holding the chassis to the bottom of the cabinet. Now free the tuning scale from the clips holding it to the front of the cabinet.

The chassis can now be withdrawn to the extent of the speaker leads which is sufficient for normal purposes. As it is taken out, the back should be tilted upwards so that the tuning scale clears the speaker. *When replacing*, do not forget the rubber washers between the chassis and the cabinet bottom.

To remove the chassis entirely, unsolder the leads to the speaker and *when replacing* connect as follows, numbering the tags from bottom to top :—1 and 2 joined together, red ; 3, blank ; 4, black ; 5, blue. The white lead goes to the earthing tag on the input transformer.

Removing Speaker.—To remove the speaker from the cabinet, remove the nuts from the four screws, and the two round-head wood screws holding the sub-baffle to the cabinet front, and the nuts from the four screws holding the speaker to the sub-baffle. *When replacing*, see that the transformer is on the right.

VALVE ANALYSIS

Valve voltages and currents given in the table (Col.3) are those measured in our receiver when it was operating on mains of 230 V, using the 220 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 FC4*	250	1·6	70	3·9
V2 VP4B	250	10·6	250	4·0
V3 2D4A	—	—	—	—
V4 PenA4	220	41·0	250	5·3
V5 IW4/350	330†	—	—	—

*Osc. anode (G2) 75 V, 0·1 mA. †Each anode, A.C.

GENERAL NOTES

Switches.—S1-S4 are the waveband switches, in a single unit beneath the chassis. They are all *closed* on the M.W. band and *open* on the L.W. band. Note that one contact of **S2** and **S3,** and one of **S1** and **S4** is common. The 740 radiogram has some extra switches, described under " Radiogram Modifications."

S5 is the Q.M.B. mains switch, ganged with the volume control **R11.**

Coils.—The band-pass and oscillator coils are in three screened units on the chassis deck, while the I.F. transformers **L13, L14** and **L15, L16** are in two further screened units, also on the chassis deck, provided with trimmers adjusted by concentric nuts and screws. The primary trimmer is adjusted by the screw in each case.

Scale Lamp.—This is an Osram M.E.S. type, rated at 6.2 V, 0.3 A.

External Speaker.—Two screw terminals on the internal speaker terminal panel are provided for the connection of an external high resistance speaker.

Condenser C22.—The oscillator L.W.

(*Continued overleaf*).

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tracker is adjusted through a hole in the chassis deck between the **V1** and **V2** valveholders.

Condensers C13, C14.—These are two 6 μF dry electrolytics with a common negative (black) lead. The red lead going to the mains transformer **T2** is the positive of **C13,** while the red lead going to the valveholder of **V4** is the positive of **C14.**

CIRCUIT ALIGNMENT

Circuit alignment follows normal practice. The I.F. transformers are first aligned at 117.5 KC/S, feeding the signal generator output between the top cap of **V1** and chassis, and adjusting the trimmers **C23, C24, C25** and **C26** in turn for maximum output.

A signal of about 220 m. is now fed into the aerial and earth sockets, the scale pointer set to the same wavelength, and **C21** is adjusted.

If there are two peaks, the correct one is the second reached when unscrewing **C21** from maximum capacity. **C19** and **C17** are then adjusted for maximum output.

The set is then switched to the L.W. band, a signal of about 1400 m. is injected, and tuned in. **C22** is then adjusted for maximum output, rocking the gang slightly if necessary to obtain the optimum setting.

RADIOGRAM MODIFICATIONS

Basically the 740 radiogram has a circuit similar to the 540 table and 640 console models. There are, however, certain additions and modifications.

In the first place, instead of the pick-up sockets being across **R11** as in our diagram (which, incidentally, necessitates the use of a pick-up with a fairly large output), one of them is connected to chassis and the other to one of the outer contacts of an extra single-pole changeover switch. The lead from **L14** to the junction of **C3** and **R6** is broken, and taken to the centre contact of the switch, the junction going to the third contact of the switch.

The lead from **L15** to the H.T. line is broken, and a 5,000 O resistance inserted. A 0.002 μF condenser is connected between chassis and the junction of this resistance and **L15.**

The lead from **C10** to **R7** is broken and taken to the centre contact of another S.P.C.O. switch. The junction of **R7** and **C7** is taken to one outer contact of this switch, while from the remaining outer contact a lead goes to the junction of **L15** and the extra resistance and condenser.

A tone control circuit, consisting of a 0.05 μF fixed condenser and a 50,000 O variable resistance in series is connected across the primary of **T1.**

C13 and **C14,** instead of being two 6μF condensers, have values of 8 μF and 12 μF respectively.

It will be seen that on radio the circuit is the same as in the table model, except for the extra resistance and condenser in the anode circuit of **V2,** which provides a certain amount of decoupling, and the variable tone control.

On gramophone, **V2** is used as an R.C. amplifier, and the radio circuit is fully muted.

The extra switches are accommodated on the wave-change switch assembly, and a gramophone position is provided.

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CIRCUIT ALIGNMENT

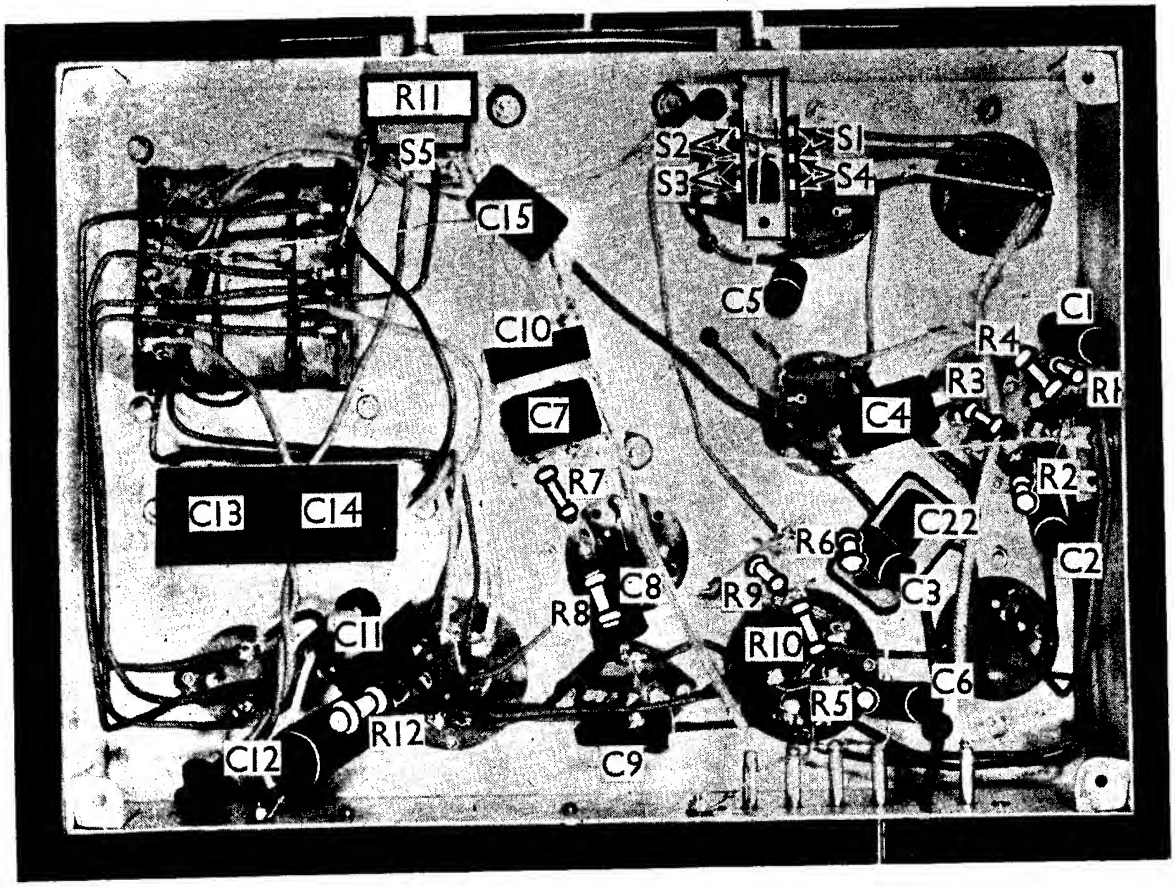
(*See pages II and III for circuit diagram and chassis illustrations.*)

I.F. Stages.—Connect a signal generator to grid (top cap) of **V1** and chassis. Switch set to M.W., and turn tuning condenser to minimum. Set generator to 456 KC/S, and adjust **C22** (screw), **C23** (nut), **C25** (screw) and **C26** (nut) for maximum output. Re-check these settings.

H.F. and Oscillator Stages.—When tuning condenser is at minimum, scale pointer should read 185 m. ($\frac{1}{4}$ in. to left of 200 m. mark). Connect an aerial and earth to the set, and loosely couple the signal generator to the aerial lead. Switch set to M.W., and turn gang to minimum. Set generator and receiver scale pointer to 200 m. and adjust **C20** for maximum output. Set generator to 230 m., tune in signal, and adjust **C18** for maximum output. Check on 550 m., then tune in London Regional, and, if necessary, adjust scale.

Switch to L.W., set pointer to 1,500 m. Feed in 1,500 m. signal and adjust **C21** (hole in front of chassis) for maximum output.

For image suppression, adjust generator to frequency of any strong transmission occurring between 250 and 285 m. With switch of set in L.W. position, tune set to receive oscillator signal, and adjust **C16** (front of chassis) for *minimum* output. Adjust generator to 456 KC/S, and couple to aerial terminal of receiver. Adjust **C15** (hole in back of chassis) for *minimum* output.



Under - chassis view. Note the simple wave-change switch arrangement. S2, S3 and S1, S4 each have one common connection. C22 is the oscillator L.W. tracker, adjustable through a hole in the chassis deck.